

Knowledge, Attitudes, and Practices of Libyan Pediatricians toward Early Childhood Caries

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ABSTRACT

Objectives: This study aimed to assess pediatricians' knowledge, attitudes, and practices (KAP) toward early childhood caries (ECC) in the governorate of Ajdabiya, Libya.

Materials and methods: A cross-sectional study of a random sample of 50 pediatricians, who work at primary healthcare centers in the governorate of Ajdabiya (in 2021). Data were collected by a self-administered questionnaire that was developed using the KAP study construction guides. Pretests of the questionnaire were performed with five pediatricians, who did not participate in the study. The collected data were analyzed using SPSS for Windows, version 25.0 (SPSS Inc). The alpha value was 0.05.

Results: The overall scores of knowledge ranged from 2 to 12, with a mean of 6.1 (SD, 1.6). For attitudes, the overall scores ranged from 7 to 14, with a mean of 12.1 (SD, 1.5). And the overall scores of practices ranged from 1 to 24, with a mean of 10.0 (SD, 4.7). There were positive correlations between the KAP overall scores. The findings showed weak associations, except between knowledge and practices, it was medium.

Conclusion: Libyan pediatricians demonstrated positive attitudes toward oral health. Nevertheless, their knowledge and practices appeared to be deficient regarding the early dental visits, the cariogenic effect of ad libitum breastfeeding, transmission of cariogenic bacteria from mothers/caregiver to the child, and the role and uses of F in preventive dentistry.

Keywords: Dental caries, Oral health, Professional attitudes, Professional behavior, Professional education.

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INTRODUCTION

The presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of six is known as ECC.¹ Susceptible teeth due to enamel hypoplasia and the vertical transmission of *Mutans Streptococci* (MS) from mother/caregiver to the child through salivary contact were stated to be important risk factors for ECC.² Frequent nighttime bottle-feeding with milk and ad libitum breastfeeding after eruption of the first primary tooth are associated with ECC.¹ Additionally, the following are considered as associated risk factors: baby bottle use after the age of 12–18 months, frequent in-between meal consumption of sugar-added snacks or drinks, bad oral habits, and lack of tooth brushing.³ Early childhood caries is a preventable and reversible disease if treated at an early stage. However, there is a noteworthy increase in ECC prevalence globally. This increase produces a negative impact on both children and their families, which leads to undesirable effects on both oral health quality of life and equalities.^{4–6} Thus, ECC is recognized as a significant public health problem, and primary preventive strategies are the most public health important priority that should be started in early childhood and continue in adulthood.^{7,8}

Dental home should be established by age one or within 6 months from eruption of the first primary tooth.⁹ Nevertheless, few children under the age of 3 years visit a dentist.¹⁰ Young children are more likely to see a pediatrician than a dental practitioner in their first few years of life, due to the need for immunization services and checkup examinations to monitor developmental progress.¹⁰

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Therefore, the pediatrician is in an ideal position to direct parents toward the prevention of oral diseases in children.¹¹ The World Health Organization (WHO) identifies oral health as important for interprofessional practice within the primary health sector, and it has identified the key role of pediatricians in children's oral health.¹² Accordingly, pediatricians should develop the knowledge base to perform oral health-risk assessment on patients beginning at 6 months of age, provide them an anticipatory guidance, and help establish a dental home for these patients by referral to dental practices by 1 year of age.¹³

Regardless of role identification, routine oral health screening and referral by pediatricians remain limited. As lack of training was commonly reported, pediatricians have limited knowledge and understanding in critical areas.¹² Therefore, the current study aimed to assess pediatricians' KAP toward ECC in the governorate of Ajdabiya.

MATERIALS AND METHODS

The study received ethical approval from both the Faculty of Dentistry, University of (Benghazi), and the Regional Council of Medicine in the city of (Libya). Verbal consent was obtained from all participants in the study.

This was a cross-sectional study of a random sample of pediatricians in primary healthcare centers in the governorate of Ajdabiya. The study was conducted from March to May 2021. According to the Regional Council of Medicine in the city, 83 pediatricians were registered in 9 primary healthcare centers for work with children in 2020. The sample size was calculated at 5% margin of error, a 95% confidence interval, and an assumed response distribution of 50%. The minimal sample size to satisfy those parameters was estimated at 69 participants. The number of doctors from each primary healthcare center was proportional to the total number of pediatricians practicing in this center. In total 69 pediatricians were visited in their work environments and invited to participate in the study.

Data were collected from the respondents using a self-administered questionnaire that was distributed as hard copies by the authors. Pediatricians were asked to fill in the questionnaires in 1 week from the drop-off date. The structure of the questionnaire was based on research literature and adapted to the objectives of the study.^{1,7,14} A KAP study construction guides were used to develop and conduct the questionnaire.¹⁵ Pretests of the questionnaire were performed with five pediatricians, who did not participate in the study, to determine the acceptability and clarity of our questionnaire, and to confirm validity as well. Then, the necessary adjustments to the questionnaire were done for an improved understanding of the participants.

The questionnaire was distributed in English and consisted of four questions relating to the demographic characteristics of participants, including questions on age, gender, qualifications and number of years in practice, along with 47 questions divided into four sections as follows:

Knowledge: This section had 15 questions sought to determine pediatricians' knowledge of risk factors and prevention of ECC. The correct answer was awarded "1 mark" each, while the incorrect answer was awarded "0 mark". The overall score ranging from 0 to 15, as higher scores, denoted more knowledge that pediatricians had.

Attitudes: This section contained 14 questions that attempted to elicit information on pediatricians' attitudes to prevention of ECC. A five-step Likert scale was used, and the degree of agreement was expressed as follows: Strongly agree, Agree, Uncertain, Disagree, and Strongly disagree. It was scored as follows: "strongly agree" and "agree" were awarded "1 mark", while "uncertain", "disagree", and "strongly disagree" were awarded "0 mark". Except for question 4 "Providing preventive dental healthcare services should be left entirely to the dentist", which was given "1 mark" for "strongly disagree", "disagree", and "uncertain", while "agree" and "strongly agree" were scored as "0". The overall score ranging from 0 to 14, as higher scores, denoted a more positive attitude.

Practices: This section consisted of 12 questions pertaining to the practice of pediatricians relating to oral health of their pediatric patients. A five-step Likert scale was used, as follows: never, rarely, sometimes, often, and always. The scoring was as follows: "never and rarely" = 0, "sometimes" = 1, and "often and always" = 2.

The overall score ranging from 0 to 24, as higher scores, indicated that pediatricians were more practicing for prevention of ECC.

Training and source of information: This section contained six questions concerning the pediatricians' level of training, sources of information, ability to inform patients and parents on tooth brushing, and the relationship between their child's diet and oral health, and identifies dental decay and plaque. Four of them with multiple choices, and two used a five-step Likert scale as follows: Poor, Fair, Good, Very good, and Excellent.

The collected data were analyzed using SPSS for Windows, version 25.0 (SPSS Inc.). Demographic data were summarized using frequencies and percentages. Scores of the KAP sections were calculated and reported by participants' demographic characteristics. Ceiling and floor effects were evaluated on the basis of the percentage of respondents with the maximum or minimum score, and were considered present if the proportion was 15% or more.¹⁶ Correlations between knowledge, attitudes, and practice scores were performed using the Spearman correlation coefficient. Also, an adjusted correlation using partial "r" was calculated after adjusting for potential confounders that included the pediatricians' age, gender, qualifications, and number of years in practice. Correlations below 0.20 were considered weak, 0.20–0.30 as medium, and >0.30 as high.¹⁷ As the data were skewed, nonparametric statistics were used (Mann–Whitney *U* or Kruskal–Wallis tests, as appropriate). The alpha value was 0.05. In addition to that, descriptive statistics were used to summarize the training and source of information section.

RESULTS

Of the 69 questionnaires that were distributed to the pediatricians, 13 were not returned, and 6 were excluded due to incomplete information. Hence, the total sample comprised 50 (72.5%). The majority of questionnaires (70%) were completed by females, 44% of participants aged between 35 and 45 years, 60% had diploma, and over half (56%) had been practicing for 5–10 years (Table 1).

The overall scores of knowledge ranged from 2 to 12, with a mean of 6.1 (SD, 1.6), and for attitudes ranged from 7 to 14, with a mean of 12.1 (SD, 1.5). For practices, the overall scores ranged from 1 to 24, with a mean of 10.0 (SD, 4.7). With no floor, neither ceiling effects for all the scores (Table 2).

Knowledge, attitudes, and practices' summary data are presented by sociodemographic characteristics of participants in Table 1. Regarding practices, females had a higher mean score than males. Those aged less than 35 years old, had master degree, and experienced for less than 5 years had the highest mean scores. However, observed differences were statistically significant for gender and age only.

There were positive correlations between the KAP overall scores. The results showed weak correlations, except between knowledge and practice, it was medium. These associations improved after controlling for confounding variables (Table 3).

Concerning pediatricians' knowledge of risk factors and prevention of ECC (Appendix 1), all the participants believed that inadequate tooth brushing and poor oral hygiene is a risk factor for dental decay (100%). The majority correctly identified that the following factors increase the child's caries risk: frequent intake of sugar-added food and drinks (96%), nighttime bottle-feeding (88%), non-physiological sucking habits (72%), and teeth with

Table 1: Knowledge, attitudes, and practices summary data, by sociodemographic characteristics of participants

Characteristics	N (%) ^a	Knowledge		Attitude		Practice	
		Median (IQR) ^b	Mean (SD) ^c	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)
Gender							
Male	15 (30)	6.0 (2.0)	6.3 (1.1)	13.0 (2.0)	12.4 (1.2)	8.0 (5.0) ^d	5.5 (4.3)
Female	35 (70)	6.0 (2.0)	6.0 (1.8)	17.0 (2.0)	11.9 (1.6)	10.0 (4.0)	10.9 (4.7)
Age (years)							
<35	21 (42)	6.0 (3.0)	6.3 (1.6)	12.0 (2.0)	11.6 (1.8)	10.0 (6.0) ^d	11.9 (5.0)
35–45	22 (44)	6.0 (1.0)	5.7 (1.2)	13.0 (1.0)	12.6 (1.0)	9.0 (4.0)	8.3 (3.4)
>45	7 (14)	6.0 (3.0)	6.7 (2.7)	13.0 (2.0)	12.1 (1.2)	7.0 (13.0)	9.6 (6.1)
Qualifications							
Diploma	30 (60)	6.0 (2.0)	6.1 (1.8)	12.0 (2.0)	12.2 (1.1)	10.0 (7.0)	9.8 (4.6)
Board	12 (12)	6.0 (3.0)	6.1 (1.5)	12.5 (3.0)	11.7 (2.3)	9.5 (3.0)	9.2 (4.0)
Master	8 (16)	6.0 (3.0)	6.0 (1.1)	13.0 (2.0)	12.3 (1.7)	10.5 (7.0)	12.1 (6.1)
Years in practice							
<5	14 (28)	6.0 (3.0)	6.6 (2.1)	12.0 (2.0)	11.7 (2.1)	11.0 (9.0)	11.6 (5.2)
5–10	28 (56)	6.0 (2.0)	6.0 (1.1)	12.0 (2.0)	12.0 (1.4)	9.0 (5.0)	9.2 (4.4)
>10	8 (16)	5.0 (3.0)	5.4 (2.0)	13.0 (2.0)	12.9 (0.8)	9.5 (6.0)	10.0 (4.9)
Total	50 (100)	6.0 (2.0)	6.1 (1.6)	12.0 (2.0)	12.1 (1.5)	10.0 (6.0)	10.0 (4.7)

^aN, number, %, percentage; ^bIQR, inter-quartile range; ^cSD, standard deviation; ^dp <0.05, obtained from Mann–Whitney U or Kruskal–Wallis tests

Table 2: Descriptive data on the knowledge, attitude, and practices scales

	No. of items	Mean (SD) ^a	Range	Floor effect N (%) ^b	Ceiling effect N (%)
Knowledge	15	6.1 (1.6)	2–12	0 (0)	0 (0)
Attitude	14	12.1 (1.5)	7–14	0 (0)	5 (10)
Practice	12	10.0 (4.7)	1–24	0 (0)	1 (2)

^aSD, standard deviation; ^bN, number, %, percentage

Table 3: Correlation between knowledge, attitude, and practice

	r ^a	Partial r ^b
Knowledge/Attitude	0.026	0.065
Knowledge/Practice	0.212	0.263
Attitude/Practice	0.132	0.272

^ar = Spearman correlation coefficient; ^bPartial r = Correlation coefficient adjusting for potential confounders which included the pediatricians' age, gender, qualifications, and number of years in practice

enamel hypoplasia (76%). However, about one-third of pediatricians correctly identified ad libitum breastfeeding as a risk factor (30%), and cariogenic bacteria can be transmitted from mother/caregiver to the child (34%). The majority of participants gave wrong responses about fluoride (F) concentrations (94–96%) and the recommended age that children should be actively discouraged from using bottle-feeding (82%).

Regarding pediatricians' attitudes toward oral health (Appendix 2), attitudes were mostly positive, with all of pediatricians who agreed that oral hygiene is important in preventing dental caries (100%).

For pediatricians' practices toward oral health (Appendix 3), half of the participants (50%) always or often evaluate oral health of their patients, recommend them to have an oral health examination, and perform a dietary habit assessment. However, around two-thirds never or rarely recommend the first dental visit for the child between 6 months and 1 year (60%) and take the information about the mother's oral health (64%). The majority never or rarely advise parents about the use of topical

Tables 4A and B: Pediatricians' training and sources of information

Table 4A:

Training	N (%) ^a
Where do you get information about prevention of dental caries?	
Associations	10 (20)
Scientific journals	4 (8)
Continuing learning	12 (24)
Colleagues	15 (30)
None	9 (18)
During your specialty education, have you received any teaching on oral health of young children?	
Yes	15 (30)
No	35 (70)
Was the amount of education devoted to oral health appropriate?	
Too much	2 (4)
Just right	11 (22)
Too little	37 (74)
Do you think you need further information about prevention of dental caries?	
Yes	41 (82)
No	9 (18)

^aN, number; (%), percentage

fluoride (80%), advice the parent about other ways of fluoride administrations (86%), and provide educational materials to parents (78%).

Almost one-third of pediatricians (30%) got information about prevention of dental caries from colleagues. The majority (70%) indicated that they had not received any education on oral health of young children during their specialty training, and 74% reported that the amount of education devoted to oral health was too little. Moreover, 82% of respondents stated that they need further information about prevention of dental caries (Table 4A). The majority (76%) felt that their postgraduate training had not adequately prepared them to assess a child's oral health. However, more than half of the participants felt confident in their ability to inform parents on the relationship between their child's diet and



Table 4B:

Training	Poor N (%) ^a	Fair N (%)	Good N (%)	Very good N (%)	Excellent N (%)
How well did your postgraduate education prepare you to assess oral health?	17 (34)	21 (42)	5 (10)	7 (14)	–
How would you rate your ability to perform the following?					
• Inform parents on the relationship between their child's diet and oral health	4 (7)	7 (14)	21 (42)	12 (24)	6 (12)
• Inform parents on toothbrushing	3 (6)	4 (8)	23 (46)	12 (24)	8 (16)
• Identify teeth with dental decay	2 (4)	6 (12)	22 (44)	12 (24)	8 (16)
• Identify dental plaque	6 (12)	14 (28)	17 (34)	8 (16)	5 (10)

^aN, number, %, percentage

oral health, inform them about tooth brushing, and identify teeth with dental decay and plaque (Table 4B).

DISCUSSION

This study assessed pediatricians' KAP toward ECC, using a random sample from primary healthcare centers in the governorate of (xxxxxx). The participants' demonstrated positive attitudes toward oral health. However, their knowledge with respect to prevention of ECC and some risk factors for dental caries was considered deficient. Their practices toward ECC appeared to be lacking, with observed differences that were statistically significant only for gender and age.

Participants were knowledgeable with respect to certain risk factors for ECC, including frequent intake of sugar-added food and drinks, nighttime bottle-feeding, non-physiological sucking habits, inadequate tooth brushing and poor oral hygiene, and teeth with enamel hypoplasia. These findings agreed with those of many previous studies.^{6,8,18} Pediatricians, who never or rarely perform a dietary habit assessment of the patient, inform the parents about the importance of oral hygiene, and advice parents to brush their children's teeth, were 30, 14, and 22%, respectively. These findings are in agreement with the study conducted in Montenegro by Golubović et al. in 2020.⁶ Thus, participants need further education and training to increase their knowledge and confidence in practicing preventive measures for oral health.

In the current study, half of the pediatricians routinely evaluate oral health for their patients and recommend them to have an oral health examination, which is in accordance with the findings of previous studies.^{18,19} This percentage has to be increased, as ECC can be detected at early stages by examining the oral cavity during the routine physical examination. Just 28% of the participants always or often recommend the first dental visit between 6 months and 1 year, which agreed with the findings of previous studies.^{7,8} However, these findings are less than those of other previous studies.^{6,18,20} These findings suggested that the majority of participants in the present study are not familiar with the recommendations of the American Academy of Pediatric Dentistry (AAPD) in establishing a dental home within 6 months of eruption of the first tooth and no later than 12 months of age.⁹

Prolonged contact of teeth with human milk results in acidogenic conditions, which leads to demineralization and dissolution of enamel. Consequently, the AAPD recommended that ad libitum nocturnal breastfeeding should be avoided after the eruption of the first primary tooth.²¹ In this study, just 30% of pediatricians considered ad libitum breastfeeding as a risk factor for ECC, this is in agreement with a Lebanese study by Nassif et al.

in 2017.²² However, this finding was much lower than that reported in previous studies (81.3–89.2%).^{19,20,23} Lack of knowledge regarding this topic might be linked to the dominant misbelief that breast milk does not cause dental caries.

The AAPD recommended avoiding saliva-sharing behaviors between mothers and their infants, as MS can be transmitted from mother to child.²⁴ In the current study, just one-third of pediatricians knew this fact, which was less than the reports of previous studies.^{18,22} Around two-thirds of participants do not take the information about mother's oral health, which is in agreement with the results of similar studies.^{6,8} Therefore, pediatricians should be up-to-date regarding this topic, as it was recommended that pediatricians have to educate the parents about the saliva-sharing behaviors, and maintain a good maternal oral health by providing oral health education.²⁴

In the current study, 84% of participants stated that F administration is important in preventing ECC. However, the majority (94–96%) wrongly answered the questions about the optimal concentrations of F for prevention of dental caries. Moreover, 56% of participants did not advice parents about the use of fluoridated toothpaste. In addition, the majority did not give parents any information about the use of topical F (80%) and other ways of F administrations (86%). These findings are in accordance with those from previous studies.^{7,18,19} However, the findings are at variance with those from the Brazilian study by Soares et al. in 2013.²¹ The findings suggest that although pediatricians have proactive attitude toward F uses in preventive dentistry, they have insufficient knowledge on how to use it and they are unaware of its benefits. This knowledge deficiency in relation to F among pediatricians was reported in several studies.²² So, pediatricians need more information about the importance and role of F in preventing dental caries.

Lack of knowledge and training was the most-stated obstacle by pediatricians in further taking a part in oral health.¹⁴ Concerning this study, the majority of participants (70%) did not receive any teaching on oral health of young children during their specialty education, and 76% felt that their postgraduate training had not adequately prepared them to assess a child's oral health. Also, 82% thought that they needed further information about the prevention of dental caries. These findings are in accordance with previous studies.^{8,23} Additionally, the findings of the current study indicated positive associations between the knowledge and practices of pediatricians. Therefore, pediatricians should be exposed to oral health-related education and provided training to increase their knowledge and confidence in this field.

Considering the limitations, the response rate for this survey resulted in a small sample size. Additionally, the self-reported

findings might not reflect the real practice behaviors, as they stated by the willingness to perform the activities. However, once confidentiality is guaranteed, these results are considered valid and the current study achieved this standard. With regard to the study's strengths, the data are from a random sample that makes the findings generalizable to the wider population.

CONCLUSION

Libyan pediatricians demonstrated positive attitudes toward oral health. Nevertheless, their knowledge and practices appeared to be deficient as regards to the early dental visits, the cariogenic effect of ad libitum breastfeeding, transmission of SM from mothers/caregiver to the child, and the role and uses of F in preventive dentistry. Furthermore, there was a medium positive correlation between knowledge and practices. Therefore, pediatricians must have the proper knowledge about children's oral health that allows them to improve their practices and enables them to play the key role that was identified by the WHO. This can be achieved by incorporating oral health education in the pediatric specialty education in (xxxxxx) medical schools. Also, seminars, workshops, and continuous training on children's oral health should be organized.

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APPENDIX

Appendix 1: Pediatricians' knowledge of risk factors and prevention of ECC

<i>Knowledge</i>	<i>Right answer n (%)^a</i>	<i>Wrong answer n (%)</i>
Which of the followings are risk factors for tooth decay/caries?		
Gender	18 (36)	32 (64)
Anatomy of oral cavity	6 (12)	44 (88)
Family tendency	13 (26)	37 (74)
Frequently intake of sugar-added food and drinks	48 (96)	2 (4)
Ad libitum breastfeeding	15 (30)	35 (70)
Nighttime bottle-feeding	44 (88)	6 (12)
Non-physiological sucking habits	36 (72)	14 (28)
Inadequate tooth brushing and poor oral hygiene	50 (100)	–
Teeth with enamel hypoplasia	38 (76)	12 (24)
Do you think dental caries causing bacteria can be transmitted from mother/caregiver to child?	17 (34)	33 (66)
What is the concentration of fluoride , in ppm, in drinking water in Ajdabiya?	2 (4)	48 (96)
What is the optimal concentration of fluoride, in ppm, in drinking water for prevention of dental caries?	3 (6)	47 (94)
What is the optimal concentration of fluoride, in ppm, in toothpaste for prevention of dental caries?	3 (6)	47 (94)
What is the minimum concentration of fluoride in toothpaste, in ppm, should child use from age 0–3?	2 (4)	48 (96)
At what age do you believe children should be actively discouraged from using bottle feeding?	9 (18)	41 (82)

^an = number, (%) = percentage.

APPENDIX

Appendix 2: Pediatricians' attitudes toward oral health

<i>Attitude</i>	<i>Positive n (%)^a</i>	<i>Negative n (%)</i>
Dental caries may be prevented.	41 (82)	9 (18)
Poor oral health of a child is an obstacle to proper growth and development.	33 (66)	17 (34)
Medical education curriculum should include more education on oral health care and prevention in children.	47 (94)	3 (6)
Providing preventive dental healthcare services should be left entirely to the dentist.	33 (66)	17 (34)
Training pediatricians to develop skills to apply caries preventive procedures would be worth the effort.	44 (88)	6 (12)
Oral hygiene is important in preventing dental caries.	50 (100)	–
Fluoride administration is important in preventing dental caries.	42 (84)	8 (16)
Routine dental visits are important in preventing dental caries.	45 (90)	5 (10)
The pediatrician has an important role in preventing dental caries.	43 (86)	7 (14)
A pediatrician should:		
Examine their patient's mouth	48 (96)	2 (4)
Inform patient and parents about the relationship between their child diet and oral health	47 (94)	3 (6)
Inform patient and parents on toothbrushing	47 (94)	3 (6)
Be able to identify dental decay	44 (88)	6 (12)
Be able to identify dental plaque	40 (80)	10 (20)

^an = number, (%) = percentage.

APPENDIX

Appendix 3: Pediatricians' practices toward oral health

<i>Practice</i>	<i>Never/Rarely n (%)^a</i>	<i>Sometimes n (%)</i>	<i>Often/Always n (%)</i>
Routinely evaluate oral health of your patients.	5 (10)	20 (40)	25 (50)
Recommend first dental visit for your patients between 6 months and 1 year.	30 (60)	6 (12)	14 (28)
Recommend that your patients have an oral health examination.	9 (18)	16 (32)	25 (50)
Take the information about the mother's oral health.	32 (64)	13 (26)	5 (10)
Perform a dietary habits assessment of your patients.	15 (30)	10 (20)	25 (50)
Inform the parents about the importance of oral hygiene.	7 (14)	12 (24)	31 (62)
Advice parents to brush their children's teeth.	11 (22)	19 (38)	20 (40)
Advice parents about the use of fluoridated toothpaste.	28 (56)	13 (26)	9 (18)
Advice parents about the use of topical fluoride.	40 (80)	3 (6)	7 (14)
Advice parent about other ways of fluoride administrations.	43 (86)	4 (8)	3 (6)
Advice other ways to prevent dental decay.	20 (40)	21 (42)	9 (18)
Do you provide educational materials to parents about interventions that are used for the prevention and control of dental decay?	39 (78)	5 (10)	6 (12)

^an = number, (%) = percentage